FIG. 1

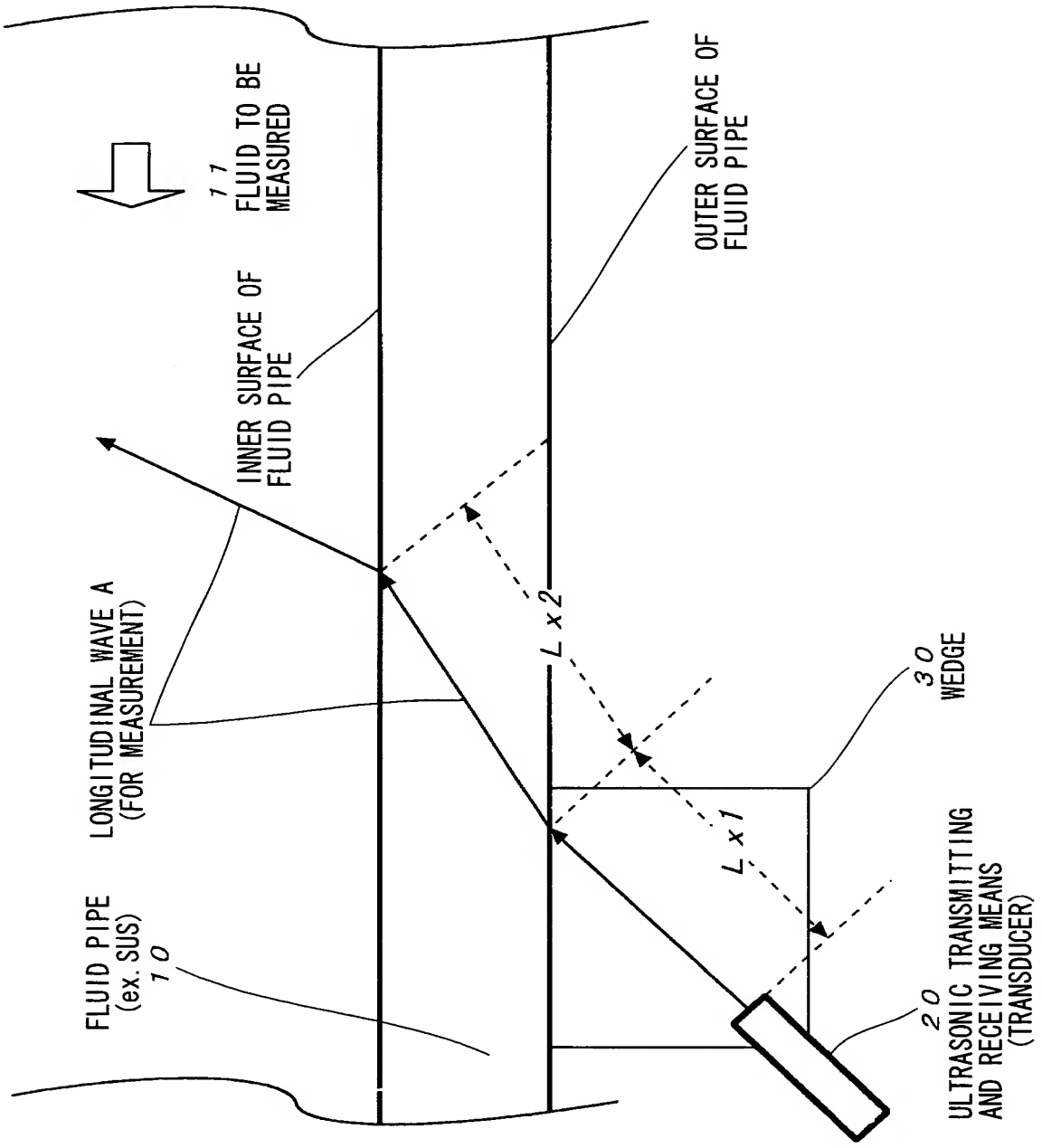

11 FLUID TO BE MEASURED
INNER SURFACE OF FLUID PIPE
OUTER SURFACE OF FLUID PIPE
LONGITUDINAL WAVE A (FOR MEASUREMENT)
L x 2
L x 1
30 WEDGE
FLUID PIPE (ex. SUS) 10
20 ULTRASONIC TRANSMITTING AND RECEIVING MEANS (TRANSDUCER)

FIG. 2

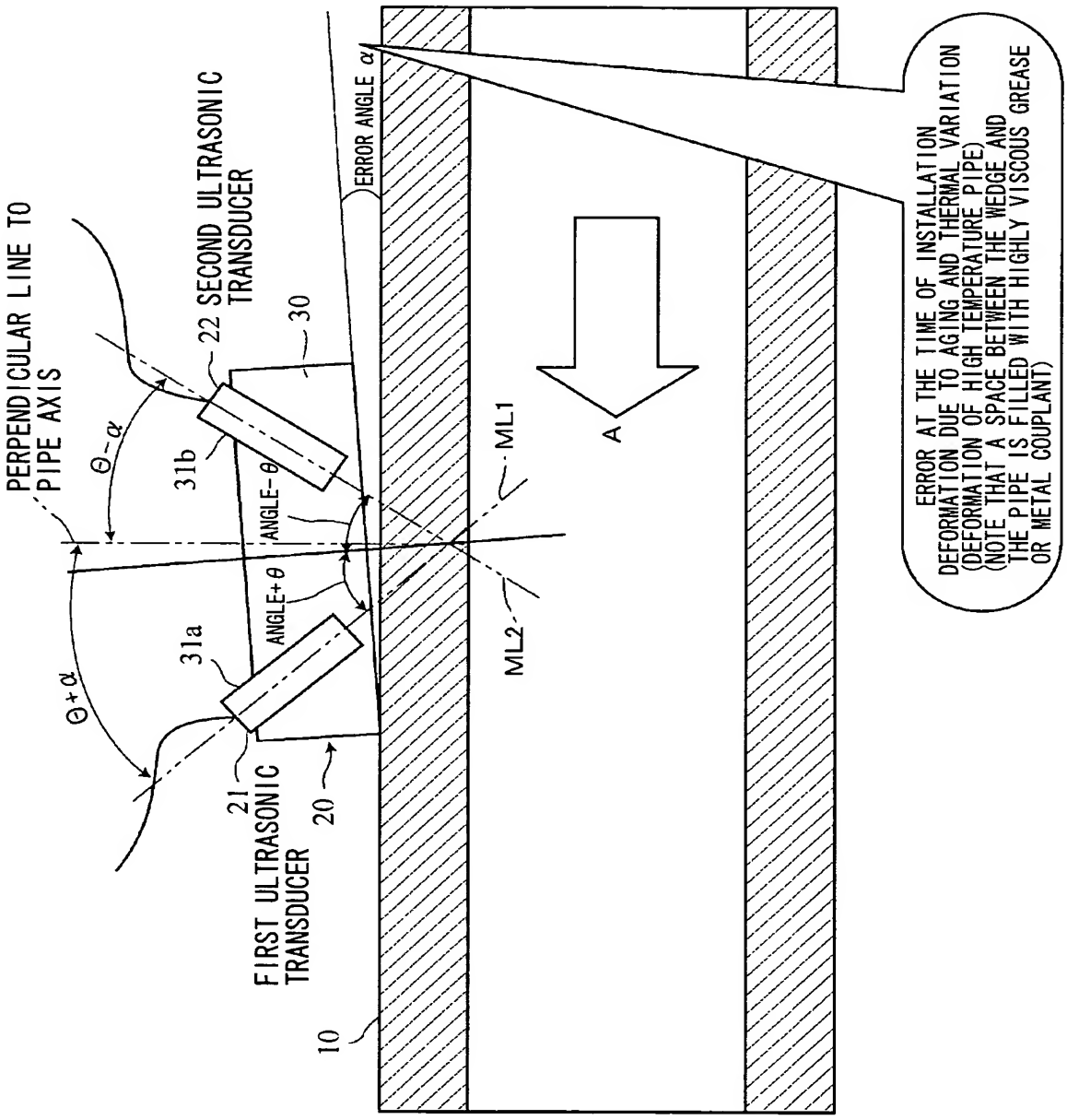
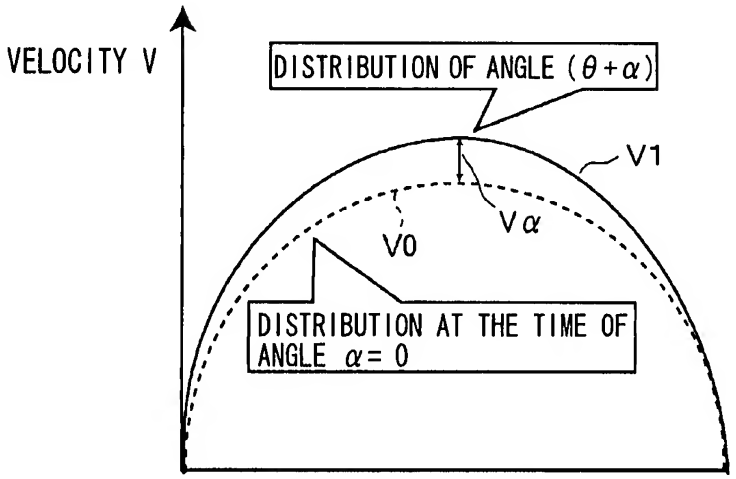
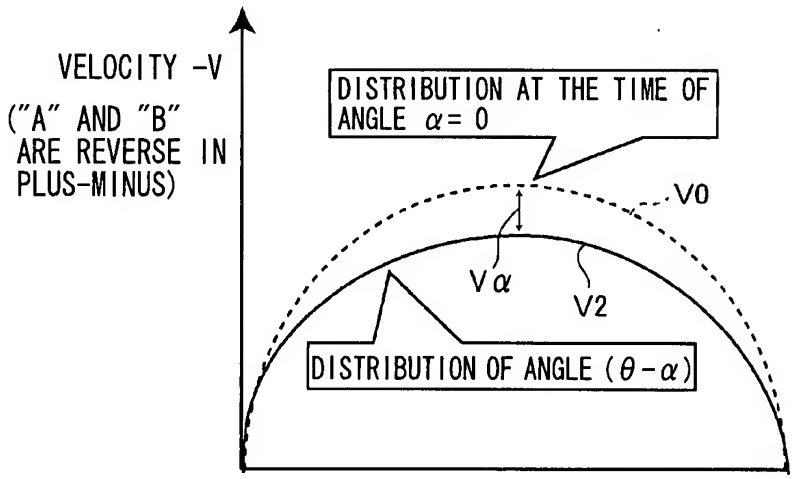

PERPENDICULAR LINE TO PIPE AXIS
Θ-α
22 SECOND ULTRASONIC TRANSDUCER
30
31b
ANGLE-θ
ERROR ANGLE α
ML1
A
ERROR AT THE TIME OF INSTALLATION
DEFORMATION DUE TO AGING AND THERMAL VARIATION
(DEFORMATION OF HIGH TEMPERATURE PIPE)
(NOTE THAT A SPACE BETWEEN THE WEDGE AND
THE PIPE IS FILLED WITH HIGHLY VISCOUS GREASE
OR METAL COUPLANT)
ANGLE+θ
31a
Θ+α
ML2
21
FIRST ULTRASONIC TRANSDUCER
20
10

FIG. 3 (a)



FLOW VELOCITY DISTRIBUTION OBTAINED FROM THE FIRST ULTRASONIC TRANSDUCER

FIG. 3 (b)



FLOW VELOCITY DISTRIBUTION OBTAINED FROM THE SECOND ULTRASONIC TRANSDUCER

FIG. 3 (c)

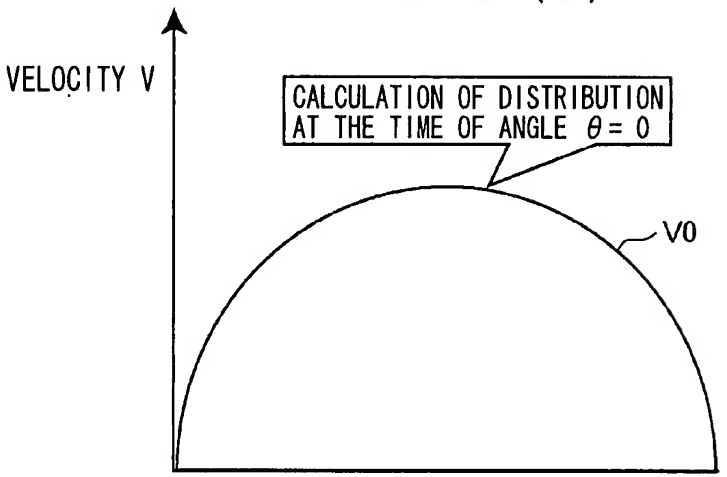


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FIG. 4

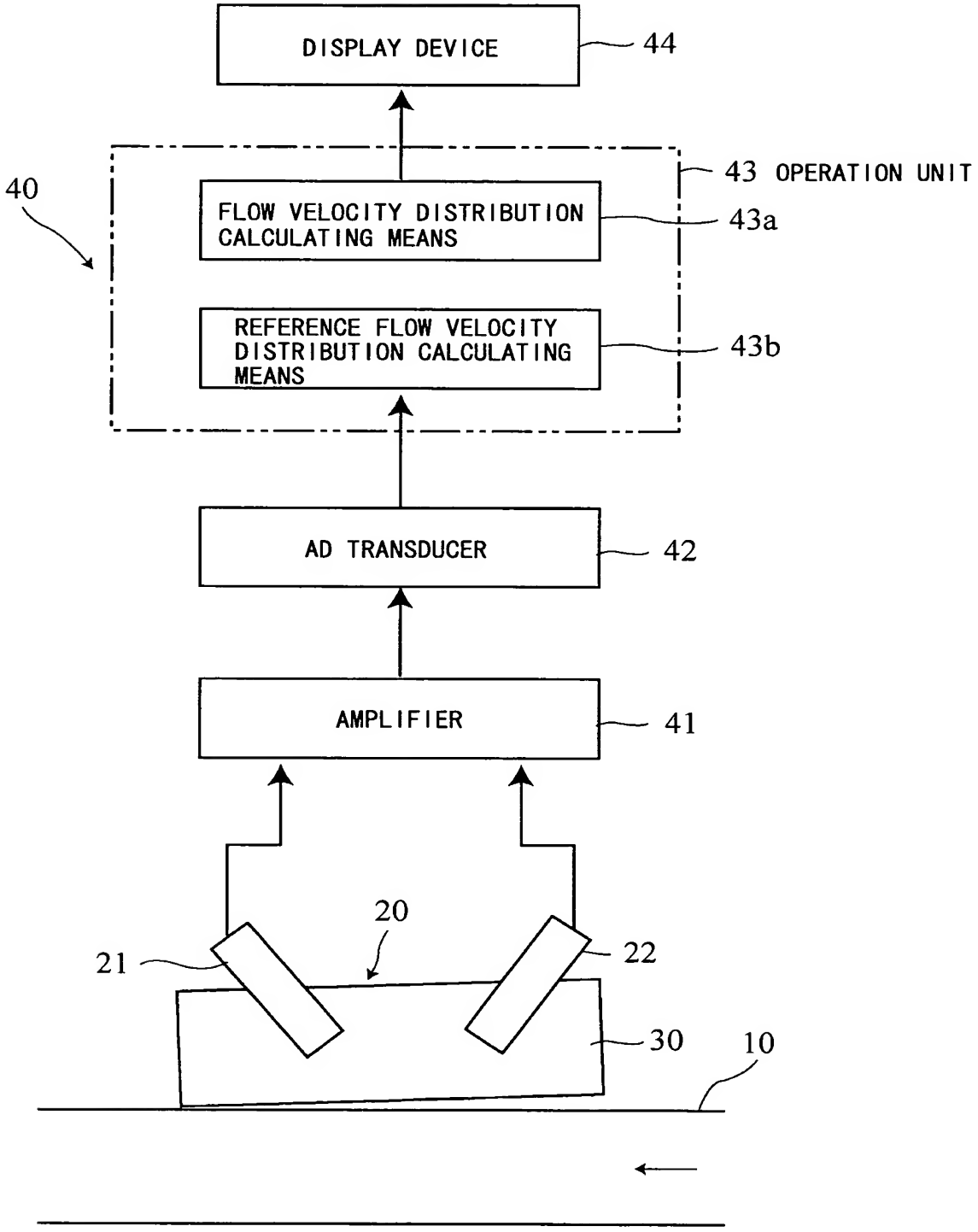

DISPLAY DEVICE
44
43 OPERATION UNIT
40
FLOW VELOCITY DISTRIBUTION CALCULATING MEANS
43a
REFERENCE FLOW VELOCITY DISTRIBUTION CALCULATING MEANS
43b
AD TRANSDUCER
42
AMPLIFIER
41
20
21
22
30
10

FIG. 5

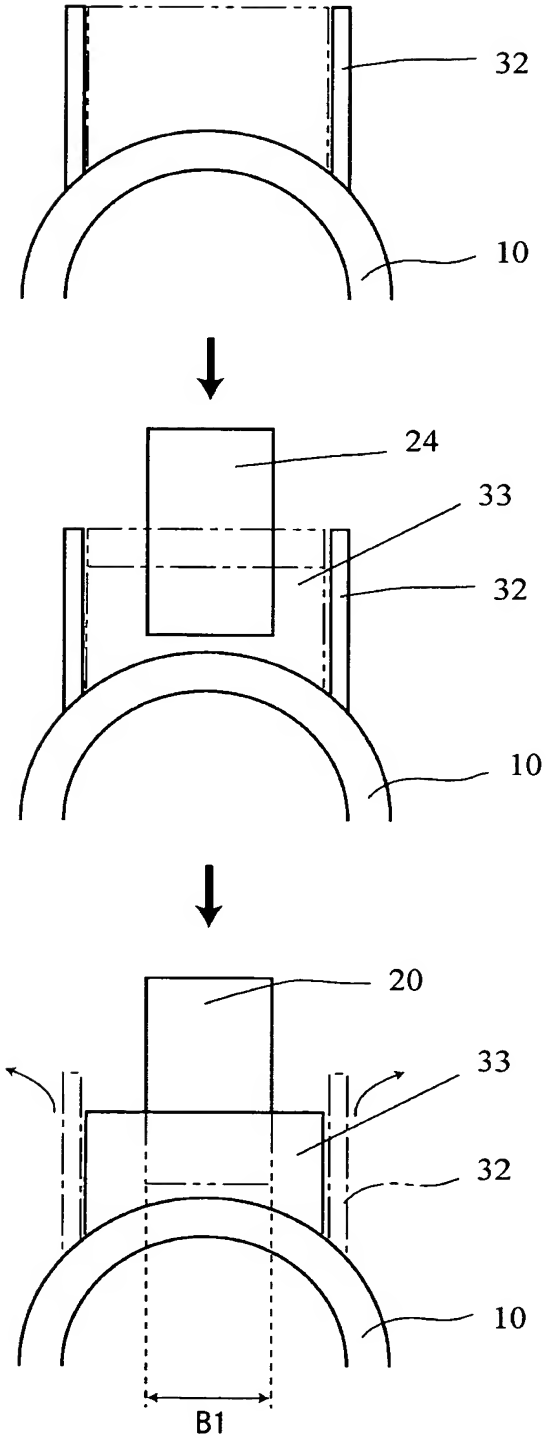


FIG. 6

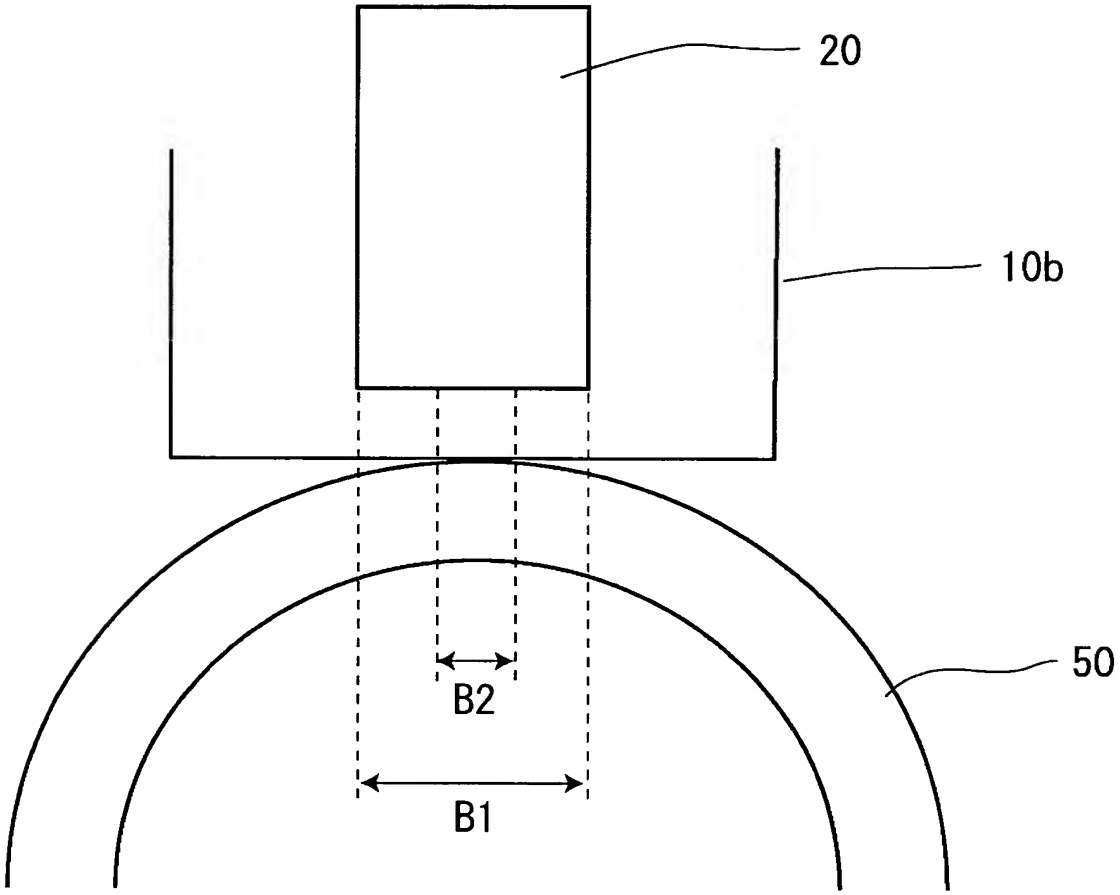


FIG. 7

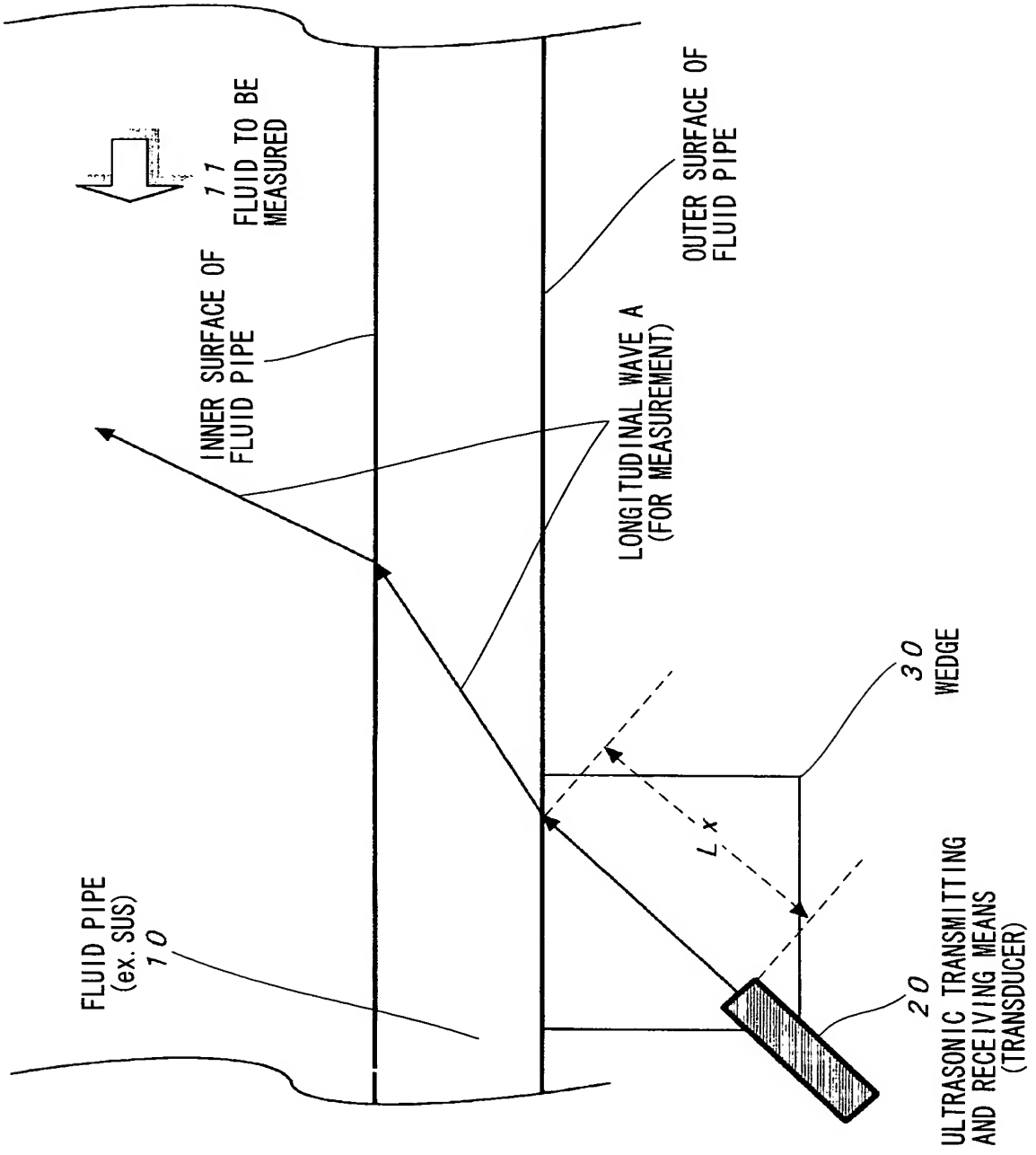

FLUID PIPE
(ex. SUS)
10
INNER SURFACE OF
FLUID PIPE
11
FLUID TO BE
MEASURED
OUTER SURFACE OF
FLUID PIPE
LONGITUDINAL WAVE A
(FOR MEASUREMENT)
Lx
30
WEDGE
20
ULTRASONIC TRANSMITTING
AND RECEIVING MEANS
(TRANSDUCER)

FIG. 8

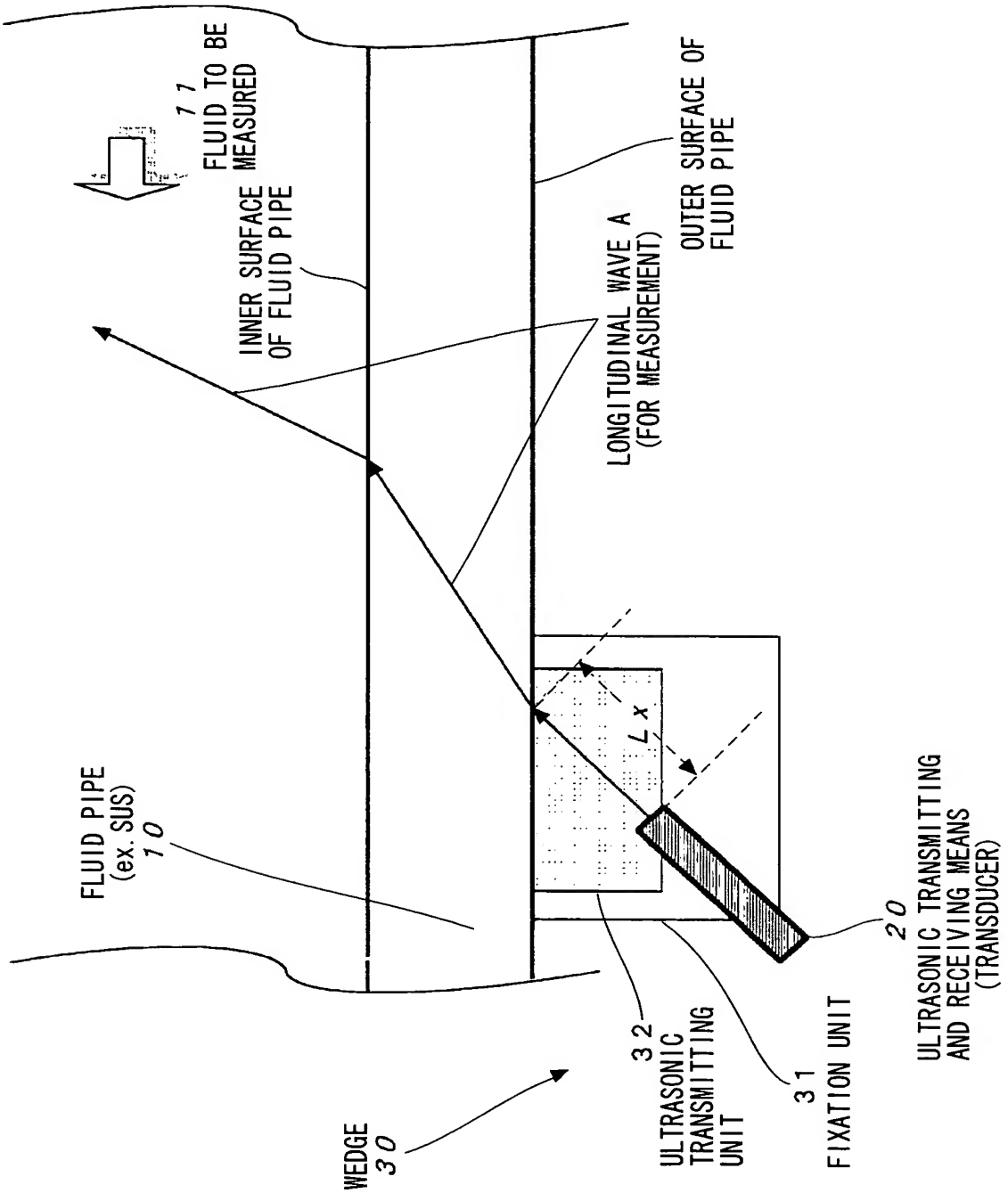
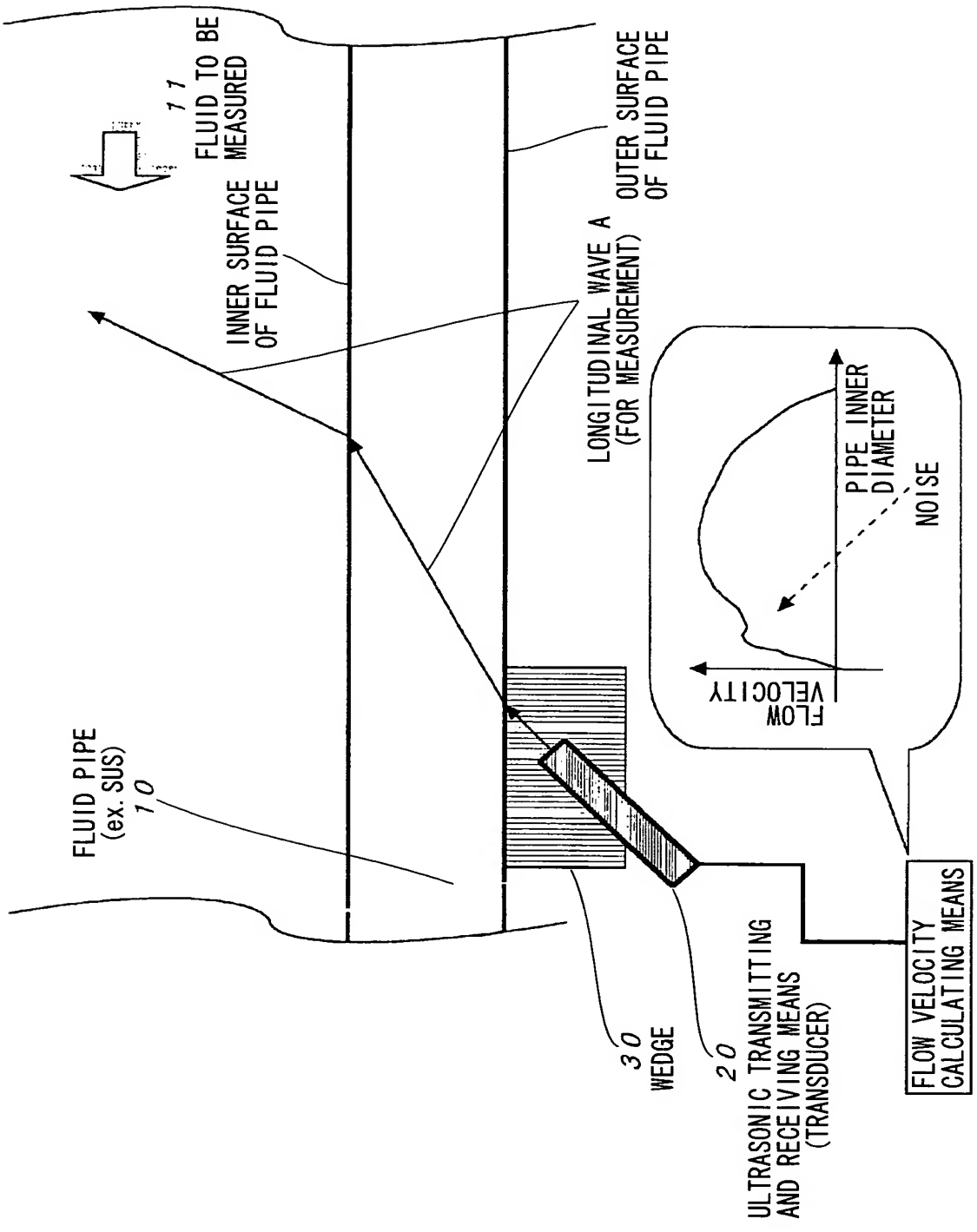

11
FLUID TO BE MEASURED
INNER SURFACE OF FLUID PIPE
OUTER SURFACE OF FLUID PIPE
LONGITUDINAL WAVE A (FOR MEASUREMENT)
FLUID PIPE (ex. SUS)
10
Lx
20
ULTRASONIC TRANSMITTING AND RECEIVING MEANS (TRANSDUCER)
31
FIXATION UNIT
32
ULTRASONIC TRANSMITTING UNIT
WEDGE
30

FIG. 9


FLUID PIPE
(ex. SUS)
10
FLUID TO BE
MEASURED
11
INNER SURFACE
OF FLUID PIPE
OUTER SURFACE
OF FLUID PIPE
LONGITUDINAL WAVE A
(FOR MEASUREMENT)
FLOW
VELOCITY
PIPE INNER
DIAMETER
NOISE
30
WEDGE
20
ULTRASONIC TRANSMITTING
AND RECEIVING MEANS
(TRANSDUCER)
FLOW VELOCITY
CALCULATING MEANS